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THE SCIENTIFIC
MONTHLY

JULY, 1920

# THE ECONOMIC IMPORTANCE OF THE SCIENTIFIC WORK OF THE GOVERNMENT[1]

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## SCIENCE IN THE WAR

THE Great War was based very largely on science and engineering. During the twenty-five years preceding the outbreak of the war the enemy had developed science and the practical applications of science in a wonderful way. He had fostered the industries, developed shipping and foreign trade, and promoted scientific research and education until the German nation stood in the forefront of the nations of the earth. With a complete misunderstanding of race psychology and an utter lack of appreciation of moral values, the enemy had prepared for a sudden attack with crushing force when a favorable occasion should arise. When the blow fell the allied nations were unprepared, not only for lack of armies and munitions, but for lack of industrial equipment, transportation facilities, and scientific development. Holding the enemy at bay under fearful odds while they built up their armies and their industries, the allied and associated powers utilized all the resources of science and engineering and a vast amount of accumulated treasure to make good their initial deficiencies and gain strength enough to wear out and overcome the enemy. In this titanic struggle scientists, engineers and captains of industry were mobilized by the tens of thousands, and men and women in the industries by the tens of millions, in order that the soldiers and sailors in the armies and the fleets might be adequately supplied with food, munitions and equipment. The wonderful achievements of science under the pressure of necessity demonstrated the economic possibilities of scientific research. This demonstration was not altogether new, but the war brought it home more forcefully, and at its close one felt that never again would anybody question the importance and economic value of scientific investigation.

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[1] Address before the Washington Academy of Sciences, May 20, 1920.

## NECESSITY FOR INCREASED PRODUCTION

The war was conducted on such a gigantic scale that the world's supply of raw and manufactured materials was largely exhausted. The increased demand thus caused for labor and commodities, together with the inflation of currency and credit and in many cases the reduced efficiency of labor has raised prices beyond all precedent. Hardship and suffering have come to hundreds of millions of people throughout the world and political and economic confusion generally has resulted.

The cost of living during the war increased considerably, but wages were so high that many classes of workers were more prosperous than ever. The government directed the channels of trade and controlled the supplies of materials with much success, and prices in most cases were kept within bounds. With the end of the war came an end of governmental control, and also with many an end of economy and thrift, and for these and other reasons prices have been mounting steadily ever since. Increased costs led to industrial unrest, strikes, high wages and further rise in prices. Profiteering has been denounced in the press and sought out by the government, but the average of prices continues to rise. It is generally agreed that in order to bring down prices it will be necessary (1) to contract currency and credit, (2) to economize in the use of necessities and luxuries, and (3) to utilize raw materials and labor more effectively and expand the production of commodities. The first remedy must be worked out by financiers and economists. The second might be accomplished by a nation-wide campaign for thrift and economy; and the third would be greatly aided by cooperative study and scientific and technical research on a comprehensive scale.

## THE GOVERNMENT AND INCREASED EFFICIENCY

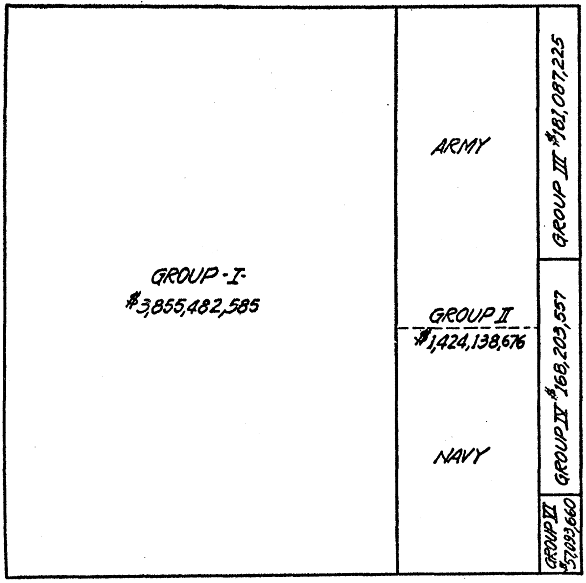
There is a shortage of labor in the country, and a tendency to shorten rather than to lengthen the hours of labor. If, therefore, production is to be increased without increased labor, it is necessary to increase the productivity of labor; that is, to increase the efficiency of men, of machines and of manufacturing methods. To economize in the use of staple commodities and luxuries, to reduce the waste of raw materials, to make use of cheaper materials, to increase the efficiency of men, of machines and of processes, on a nation-wide scale and at an early date will call for intelligent and energetic effort, comparable in difficulty and importance with the task before the country in 1917 when we entered the world war. It is not merely in order to reduce the cost of living to those millions whose incomes have not increased in proportion to the rise in prices, and who in many cases are suffering hardship and distress; but it is to allay industrial discontent and forestall economic and political disturbance or even disaster. The confusion and inequity that have resulted from the rise of prices threaten the stability of society. The governments of the world are face to face with the problem of improving conditions and allaying discontent. To hold that governments cannot or should not deal constructively with the most serious problems of society, but that such matters should be left to chance, without organized effort or leadership, is not a satisfactory position to take after the successful experience with government leadership in the war. The old idea that the less government we have the better, no longer applies, if it ever did. Society is made up in part of a multitude of groups, some of which are highly organized, and many are seeking the advantage of the group rather than of society as a whole. The government represents the interests of society as a whole, and its problems and responsibilities have increased enormously in recent years.

## THREE KINDS OF GOVERNMENTAL FUNCTIONS

Henry C. Adams, in his treatise on the Science of Finance, classifies governmental functions into three groups, namely, (*a*) The protective functions of government, (*b*) the commercial functions of government and (*c*) the developmental functions of government.

(*a*) The protective functions of government are divided into three principal classes: (1) Protection against invasion or encroachment from without is provided by the army and navy, and this has always been an important and relatively expensive department of a national government. (2) Protection of life, property and reputation, which is accomplished through police, fire departments and the courts. (3) Protection against the spread of disease, either physical or social. As crime is looked upon as a phase of social disease, this will include prisons, asylums, sanitary provision, public charities, etc.

(*b*) The commercial functions of government include those which render a service for which payment is made by the in-



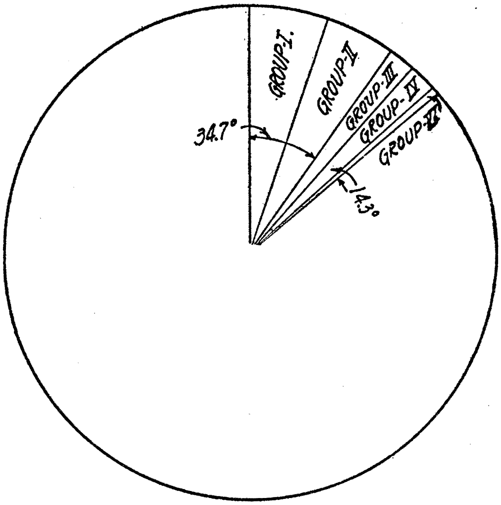
Distribution of Government Appropriations
For Fiscal Year 1920.

dividuals served, and are in general self-supporting. They address themselves primarily to the personal needs of the citizen rather than to the social needs of the state, and are performed by the state because it can render the service better or cheaper than private agencies. Examples are the post office, and in some cases railways, canals, telegraphs and other public utilities, patents and insurance.

(*c*) The developmental functions of government "are such as spring from a desire on the part of society to attain higher forms of social life." Society is not merely a collection of individuals, but is a conscious organism, and the interests of society require collective action in developing itself. This includes, (1) public education, (2) public recreation, (3) providing those legal and administrative conditions in which private business will be conducted in a just and equitable manner, (4) public investigation and control of public utilities, (5) developing the resources and wealth of the state, which includes scientific and industrial research.

## DEVELOPMENTAL FUNCTIONS OF THE FEDERAL GOVERNMENT

These three classes of functions are exercised to some extent by municipal and state governments as well as the federal government. For the present we are concerned only with

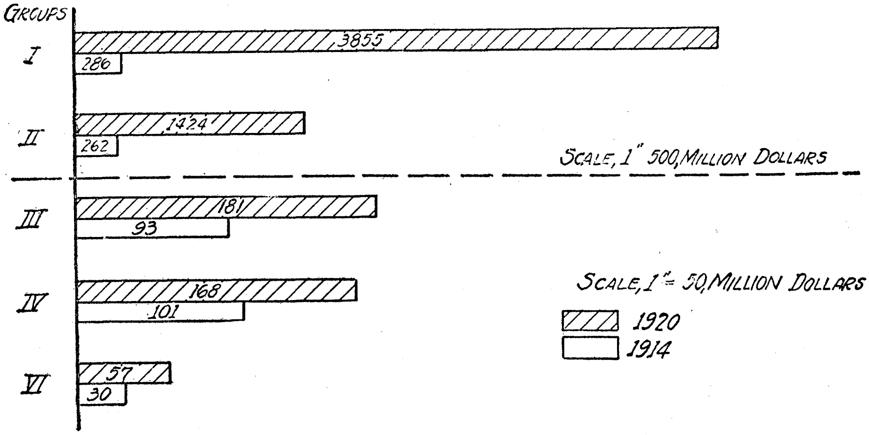


Appropriations for Fiscal Year 1914 on 1920 Circle
Appropriations for 1920 = 360°
Appropriations for 1914 = 49°

those exercised by the federal government. The powers of the federal government were delegated to it by the states, and were intended to be those required for the exercise of sovereignty by the nation in its relation with other nations, the maintenance of a national army and navy, the provision of a national currency, a common postal system, a uniform system of weights and measures (although this was not carried out as intended), the regulation of interstate commerce, etc.

In the early years of our history, society was relatively simple, communication and travel were infrequent, and each community was comparatively independent. Hence local governments were, in many respects, more important than national. With the developments in transportation and communication which have resulted from steam and electricity, the forty-eight states have come very close together, commerce and industry have much in common everywhere, uniformity of practise and uniformly good practise are generally desired, and it has been a problem how to avoid confusion of administration and industrial practise when there were so many legislatures and administrative bodies acting independently of each other. This has been partly accomplished by the cooperation of federal agencies with state bodies, leaving the legal authority with the states.

Many protective and developmental functions have long been exercised by the federal government because they were of

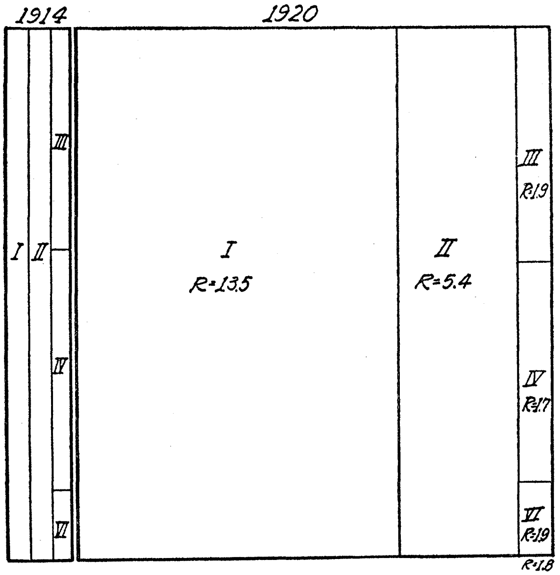


*Comparison of Government Appropriations for Fiscal Years 1920 and 1914*
*(Figures in Bars Represent Millions of Dollars)*

common interest to all the people, and they could be performed more effectively and more economically by the federal government than by the several states, and there was no practicable way of getting the states to work in harmony on a common program. The people who support the federal government are the same people who support the forty-eight state governments, and hence the plan of acting together through the federal government in performing functions of interest to all is not only economical and efficient but logical and just.

## SCIENTIFIC RESEARCH A LUXURY OR A NECESSITY?

For many years the revenues of the federal government were ample and easily obtained. Taxation was indirect and not felt and many of the developmental functions of the government were exercised with little question or objection. The Great War involved enormous expenditures and increased the fixed charges due to the public debt and other war obligations to several times the former budget. The result is that expenditures for education, scientific research and development work are severely scrutinized, and the question is raised as to whether we can afford to carry on such work on a generous scale. It is, of course, proper that every item in the national budget be closely scrutinized, and that nothing be passed which cannot justify itself. It is desirable, therefore, to inquire whether scientific research as carried on by the federal government is a luxury or a necessity; whether it is something to be



Comparison of Government Appropriations by Groups
For Fiscal Years 1914 and 1920
Total for Groups-1914 = 773,607,184.
Total for Groups-1920 = 5,686,005,706.
R= Ratio of 1920 to 1914

enjoyed when taxes are light and curtailed when taxes are heavy; or whether it is creative and wealth producing, and therefore to be increased and developed when expenses are abnormally large and a heavy debt must be liquidated. The question is, in short, whether scientific and industrial research and education are like good seed and fertilizer to a farmer, which are essential to the best success; or whether they are as luxuries to the rich which consume but do not produce, and which should be curtailed when necessary expenses increase.

## THE NATIONAL BUDGET

In order to discuss the question concretely and with reference to actual conditions, let us examine the national budget as it stands for the current fiscal year, with appropriations amounting to a total of $5,686,005,706, as given in the regular supply bills and three deficiency bills prior to May 1, 1920. For convenience, we may divide it into six parts as follows:

*Group I.* Obligations arising from recent and previous wars, including interest on the public debt, pensions, war risk insurance, rehabilitation and care of soldiers, deficit in the operation of railways, expenditures of the Shipping

| | | |
|---|---|---|
| | Board, European food relief and the bonus to government employees to partially cover the increased cost of living due to the war, a total of | $3,855,482,585 |
| *Group II.* | War and Navy Departments, expenses somewhat above a permanent peace-time basis | $1,424,138,677 |
| *Group III.* | Primary governmental functions, including Congress, President and White House staff, courts and penal establishments, departments of Justice, State, Treasury, Interior, Commerce, Labor, Interstate Commerce and other commissions, one-half the District of Columbia including all the necessary functions of government other than defense, except the commercial activities of Group V. and the research, education and developmental work of Group VI. | $ 181,087,225 |
| *Group IV.* | Public works, including rivers, and harbors, public buildings, reclamation service, post roads, national parks and railway in Alaska | $ 168,203,557 |
| *Group V.* | Commercial or self-supporting activities, including the Post Office, Patent Office, Land Office, Panama Canal, and Housing Corporation, which taken together earn their expenses | |
| *Group VI.* | Research, educational and developmental, including the wide range of work of the Agricultural Department, Geological Survey, Bureau of Mines, Coast and Geodetic Survey, Bureau of Standards, Bureau of Fisheries, Bureau of Foreign and Domestic Commerce, Bureau of Labor Statistics, Women's and Children's Bureaus, Vocational Education, Colleges for Agriculture and Mechanical Arts, Library of Congress, Smithsonian Institution and the Public Health Service | $ 57,093,661 |
| | Total | $5,686,005,705 |

## Appropriations for Fiscal Year Ending June 30, 1920

(As given in regular supply bills and three deficiency bills prior to May 1, 1920)

### *Group I. Expenditures arising from Recent and Previous Wars*

| | |
|---|---|
| Interest on the public debt[2] | $1,076,637,000.00 |
| Pensions | 216,382,540.00 |
| War risk insurance (estimated expenses above receipts $102,000,000) | 120,852,806.00 |
| Federal Board for Vocational Education (rehabilitation) | 30,000,000.00 |
| Public Health Service (care of soldiers, etc.) | 25,901,517.14 |
| Soldiers' and sailors' homes, cemeteries, etc. | 14,639,010.00 |
| Federal control of transportation. (Deficit and Advances)[3] | 1,550,000,000.00 |

| | | |
|---|---|---|
| United States Shipping Board (estimated expenses, including funds reappropriated) | | 685,842,000.00 |
| European food relief | | 100,000,000.00 |
| Other expenditures due to recent war | | 4,467,712.46 |
| Bonus to government employees | | 30,760,000.00 |
| | 67.81% | $3,855,482,585.60 |

### *Group II. War and Navy Departments (Somewhat above Permanent Peace-time Expenditures)*[4]

| | | |
|---|---|---|
| War Department—Military | $797,913,898.95 | |
| Civilian | 6,373.949.12 | $804,287.848.07 |
| Navy Department—Military | 617,621,353.56 | |
| Civilian | 2,229.474.94 | 619,850,828.50 |
| | 25.02% | $1,424,138,676.57 |

### *Group III. Primary Governmental Functions*

| | | |
|---|---|---|
| Legislative | | $ 10,837,936.47 |
| Executive (President and White House Staff) | | 224,080.00 |
| Judicial (Federal Courts, Penal Establishments, etc.) | | 12,124,884.24 |
| Department of Justice | | 4,483,671.70 |
| State Department | | 12,331,371.97 |
| Treasury Department: | | |
| General, including collection of customs | $ 29,065,653.22 | |
| Internal Revenue Service | 29,751,170.00 | |
| Coast guard | 8,880,523.33 | |
| Bureau of Engraving and Printing | 7,010,425.00 | 74,707,771.55 |
| Department of Interior: | | |
| General, including Alaskan Expenditures | 1,940,684.92 | |
| Indian Office and Indian Service | 11,437,187.00 | 13,377,871.92 |
| Department of Commerce: | | |
| General, including Bureau of Navigation | 920,725.52 | |
| Bureau of Lighthouses | 8,411,030.00 | |
| Steamboat Inspection Service | 995,890.00 | |
| Bureau of Census | 17,550,000.00 | 27,877,645.52 |
| Department of Agriculture: | | |
| Meat Inspection Service | | 3,000,000.00 |
| Department of Labor-Immigration, Naturalization: | | |
| Employees' Compensation, Conciliation, etc. | | 5,464,337.32 |
| Interstate Commerce Commission | | 5,313,086.90 |
| Federal Trade Commission | | 1,205,000.00 |
| Civil Service Commission | | 543,700.00 |
| Joint Commission on Reclassification of Salaries | | 50,000.00 |
| U. S. Tariff Commission | | 300,000.00 |

[2] Disbursements for interest on public debt for the fiscal year 1920 will be somewhat less than appropriations.

[3] Appropriations to Railroads include $300,000,000 loan, but do not include the deficit from March 1 to June 30, 1920.

[4] Disbursements for fiscal year 1920 will exceed by about one billion of dollars the above appropriations for the War and Navy Departments because of balances of appropriations carried over from 1919.

| | | |
|---|---|---|
| Bureau of Efficiency | | 145,000.00 |
| One half District of Columbia, Hospitals, etc. | | 9,100,867.82 |
| | 3.19% | $ 181,087,225.41 |

*Group IV. Public Works*

| | | |
|---|---|---|
| War Department—Rivers and Harbors | | $ 43,456,653.15 |
| Treasury Department—public buildings (equipment and construction) | | 10,319,076.11 |
| Repairs and maintenance of public buildings in D. C. | | 1,139,633.20 |
| U. S. Reclamation Service | | 7,511,000.00 |
| Department of Agriculture—rural post roads | | 99,000,000.00 |
| National Park Service | | 777,195.00 |
| Construction of railroad in Alaska | | 6,000,000.00 |
| | 2.97% | $ 168,203,557.46 |

*Group V. Commercial or Self-supporting Government Activities*

| | |
|---|---|
| Post Office Department—Surplus, 1919 | $ 2,342,851.96 |
| Department of Interior: | |
| Patent Office—Surplus, 1919 | 106,654.10 |
| General Land Office—Estimated Surplus, 1920 | 1,500,000.00 |
| U. S. Housing Corporation—Estimated Operating Surplus, 1920 | 1,012,973.00 |
| Panama Canal—Estimated Deficit, 1920 | 3,297,337.00 |

*Group VI. Research, Eductional and Developmental*

| | | |
|---|---|---|
| Department of Agriculture: | | |
| Forest Service—less receipts of $4,750,000.00 | $ 4,191,869.00 | |
| Bureau of Animal Industry | 5,783,231.00 | |
| States Relations Service | 4,905,820.00 | |
| Bureau of Plant Industry | 3,379,638.00 | |
| Cooperative Agricultural Extension Work | 3,080,000.00 | |
| Bureau of Markets | 2,811,365.00 | |
| Weather Bureau | 1,880,210.00 | |
| Bureau of Entomology | 1,371,360.00 | |
| Bureau of Chemistry | 1,391,571.00 | |
| Bureau of Biological Survey | 742,170.00 | |
| Bureau of Public Roads | 594,320.00 | |
| Bureau of Soils | 491,235.00 | |
| Bureau of Crop Estimates | 372,484.56 | |
| Bureau of Farm Management and Farm Economics | 302,590.00 | |
| Horticultural and Insecticide | 252,940.00 | |
| Miscellaneous Investigations | 2,589,400.00 | |
| General Administration | 1,715,626.58 | $35,855,830.14 |
| Department of the Interior: | | |
| Geological Survey | $ 1,661,353.50 | |
| Bureau of Mines | 1,216,897.00 | |
| Bureau of Education | 241,960.00 | |
| Howard University | 121,937.75 | 3,242,148.25 |

| | | |
|---|---|---|
| Department of Commerce: | | |
| Coast and Geodetic Survey | $ 1,925,370.03 | |
| Bureau of Standards | 1,892,260.00 | |
| Bureau of Fisheries | 1,274,490.00 | |
| Bureau of Foreign and Domestic Commerce | 912,510.00 | 6,004,630.03 |
| Department of Labor: | | |
| Bureau of Labor Statistics | $ 321,690.00 | |
| Women's and Children's Bureaus | 320,140.00 | 641,830.00 |
| Treasury Department—Public Health Service | | 4,025,440.00 |
| Federal Board for Vocational Education | | 3,182,000.00 |
| Colleges for Agricultural and Mechanic Arts | | 2,500,000.00 |
| Library of Congress | | 925,825.00 |
| Smithsonian Institution | | 715,957.51 |
| | 1.01% | $ 57,093,660.93 |

### SUMMARY

| | | | |
|---|---|---|---|
| *Group I.* | Expenditures arising from Recent and Previous Wars | $3,855,482,585.60 | 67.81% |
| *Group II.* | War and Navy Departments | 1,424,138,676.57 | 25.02% |
| *Group III.* | Primary Government Functions | 181,087,225.41 | 3.19% |
| *Group IV.* | Public Works | 168,203,557.46 | 2.97% |
| *Group VI.* | Research, Educational and Developmental | 57,093,660.93 | 1.01% |
| | Total | $5,686,005,705.97 | 100.00% |

## ONE PER CENT. FOR RESEARCH, EDUCATION AND DEVELOPMENTAL WORK[2]

The first two groups together amount to 92.8 per cent of the total; public works amount to 3 per cent, primary governmental functions 3.2 per cent, and research, education and developmental work 1 per cent. The population of the country being about 110,000,000, the total budget is about $50 per year per capita, of which fifty cents per year per capita is expended for the wide range of research, education and development work included in Group VI. That is, of the fifty dollars per year per capita collected for all purposes, a dollar and a half per year per capita is spent for what is here called the primary functions of government; nearly as much more is put into

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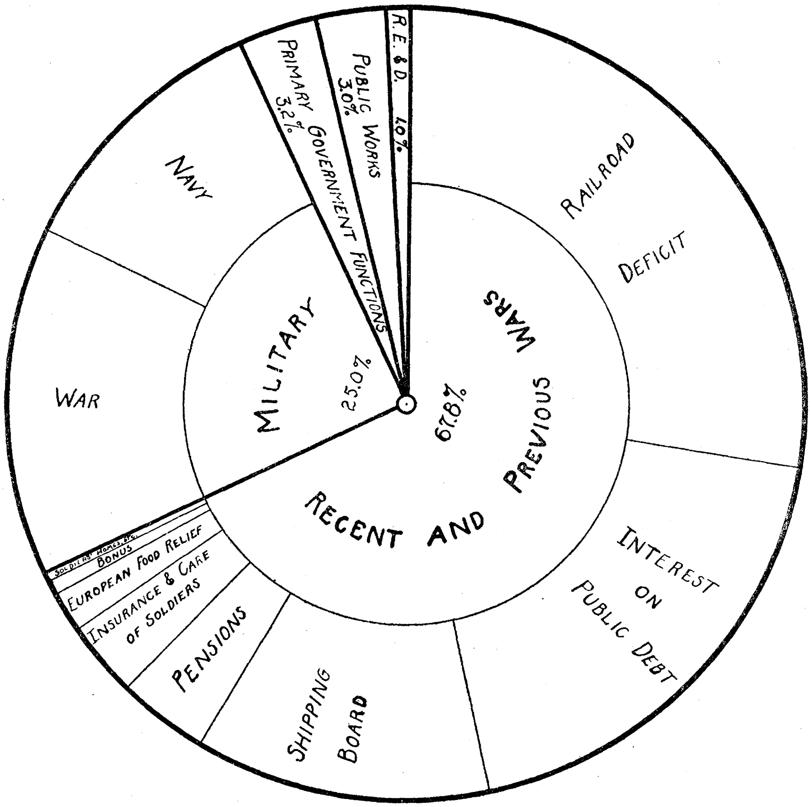
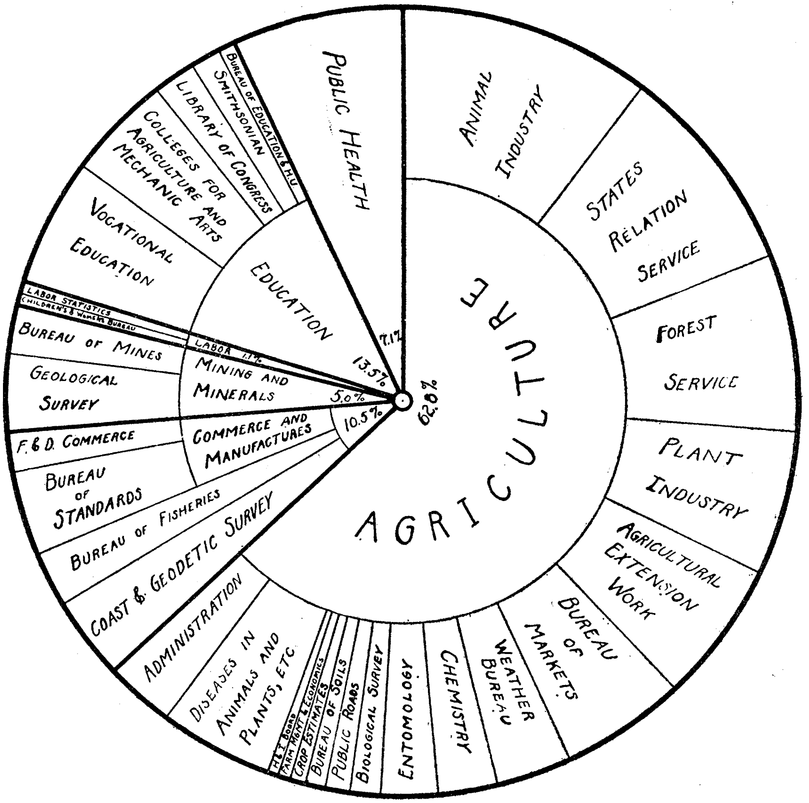
[2] For the next fiscal year, the appropriations needed for the railroads and Shipping Board, and for the Army and Navy, will be very much less than for the current fiscal year. The Treasury Department therefore expects to be able to make a very substantial reduction in the floating debt, now amounting to nearly three billions of dollars. The appropriations for Group VI for the next fiscal year are substantially the same as for this year. The ratio of Group VI to the total will therefore be substantially the same as at present (namely, one per cent), if we include, as we should, the payments on floating debt and sinking fund in Group I, and if the total revenues for next year are approximately the same as this year.



DISTRIBUTION OF GOVERNMENT EXPENDITURES FOR FISCAL YEAR 1920

public works, and fifty cents per year is put back into research, educational and developmental work, to promote scientific research, to increase production and efficiency, to develop wealth, to promote the public health, and to conserve our natural resources. This is a very small part of the total, hardly enough to be regarded as a burden on the nation. Indeed, one is led to wonder whether the total burden of taxation would not be lighter if the expenditure for scientific and developmental work were increased; if, for example, it were one dollar per year per capita instead of fifty cents. In other words, if $110,000,000 were expended annually for this creative and productive work, would it not be easier to collect the five and a half billions for other purposes? To answer this question intelligently, it will be well to look a little closer into how the fifty cents per capita is expended and what is accomplished thereby.



DISTRIBUTION OF EXPENDITURES OF GROUP VI
FOR RESEARCH, EDUCATION AND DEVELOPMENT

## WORK OF THE AGRICULTURAL DEPARTMENT

Nearly two thirds of all the expenditures made under Group VI. are for the work of the Agricultural Department. Agriculture is the most important industry of the nation. Agricultural and animal products amount possibly to twenty-five billions of dollars per year. Food has risen in price in recent years along with other products, partly because of higher wages and higher cost of machinery and supplies used by farmers, but largely because the urban population has increased faster than the rural and the demand for food products has increased faster than the supply. It is of prime importance to city dwellers that food products be produced in greater quantity, and this requires an increased efficiency or an increased rural population, or both. The Agricultural Department carries on a wide range of educational and experimental work in order to increase the production of farm products and to promote the interest of the farmer in his work, as well as to make life on the farm and in rural communities more attractive. This not only benefits the farmer, but tends to keep food prices within reason for city dwellers. It is therefore serving all the people, and its work was never so much needed as at the present time. It is spending about $1.50 for every $1,000 of value of agricultural and animal products, and without doubt the results achieved pay many times the cost of the work. The work of the Forest Service is nearly self-supporting, and might have been put into Group V. This year, owing to unusual forest fires, its deficit is larger than usual. Ultimately, it will be more than self-supporting. The work of the various bureaus is of great importance and absorbing interest, but time does not permit even a brief description.

### THE GEOLOGICAL SURVEY AND THE BUREAU OF MINES

The Geological Survey and the Bureau of Mines are concerned with the mineral industries of the country; coal, iron, copper and the other industrial and precious metals, oil, gas and the water supply and the topography of the land. Our country is rich in these natural resources and we are spending them in prodigal fashion. It is the business of these two bureaus to survey and map the distribution of metals and minerals; to look for new sources of supply; to gather statistics and to increase safety and efficiency in the mining and metallurgical industries; and to consider what can be done to conserve these natural resources which, unlike the products of agriculture, are not reproduced in annual cycles, but when once used can never be replaced. In addition, topographic and water power surveys are made and mapped. The products of the mineral industries of the country amount possibly to six billions of dollars per year. They are indispensable to our manufactures, and a most important part of our national wealth. If these two bureaus were to spend in this important work of research and development, an amount equal to one dollar in a thousand of the annual value of mineral products, it would amount possibly to six millions of dollars per year, which is more than double present expenditures. Can there be any doubt that such a sum expended in the interest of the public that pays the entire cost, and must bear the burdens of any inefficiency that exists in the industries, would be amply repaid? For example, millions of dollars are worse than wasted every year in accidents that could be prevented. Mining is one of the most hazardous of industries. The Bureau of Mines has done a great deal of valuable work, both in research and education, to make mining safer; but there is need for a great deal more than it has been able to do. The results of such work are available in all the states where mining is carried on. It can generally be done better, and far more economically, than if done by the states unaided by the federal government. These two bureaus are doing a work of great economic importance at a cost to the people of this country of three cents per capita per year. If it were doubled the burden would be only slightly increased, but the service rendered in the increased efficiency of production and fewer accidents and more intelligent use of our natural resources would be very considerable. This is a splendid example of the economic and social value of cooperation of all the people through the agency of the federal government in doing efficiently what is needed by all.

## THE BUREAUS OF STANDARDS AND OF FOREIGN AND DOMESTIC COMMERCE

The Bureau of Standards develops and maintains the standards of length, mass, volume, temperature, electrical and optical measurements, prepares standard chemicals and does many other kinds of fundamental work; it does testing for the government and the public, and it carries out scientific and industrial researches to develop the industries. A very large amount of work is done for the army, navy and other departments and for state institutions, so that not more than one half of its total expenditures can properly be considered as used for the development of the industries. Excluding food products, tobacco and liquors, the annual value of manufactured products in this country, over and above the value of the raw materials entering into them, is possibly $12,000,000,000. The Bureau of Standards spends this year a sum not more than 15 cents per $1,000 of manufactured products in all its work, and as stated above, not more than one half of it is for the purpose of developing these manufactures. If this sum could be considerably increased, it would enable a much larger amount of work to be done and the work could be carried on more efficiently. I shall give examples presently of such work, and you may judge whether it would be profitable.

While the Bureau of Standards maintains and makes available the standards of measurement, of quality, of performance, and of practise, for commerce and the industries, and engages in research to develop the industries, the Bureau of Foreign and Domestic Commerce is concerned with the development of commerce and our export trade. The importance of foreign trade to a great nation, and the opportunity and duty of the government in fostering that trade in all legitimate ways, need no emphasis on this occasion. In view of the position of America as a world power, and in view of the general desire that our foreign commerce may be not only profitably but creditably conducted, it would seem that this function of the government would be developed and strengthened.

## THE COAST SURVEY AND THE BUREAU OF FISHERIES

The Coast and Geodetic Survey is one of the oldest branches of the government doing scientific and technical work, and until the establishment of the Bureau of Standards, kept the standards and did the testing of weights and measures. It is charged with the survey of the coasts and rivers to the head of ship navigation, and the publication of charts, giving the results of base measurements, triangulation, topographic and hydrographic surveys, deep sea soundings, temperature, magnetic observations, gravity research, determination of heights, latitude, longitude, and reference points for state surveys. The work is very fundamental and important and has been done with a high order of precision and thoroughness, and with marked credit to the government.

The purpose of the Bureau of Fisheries is the stimulation of the production and consumption of fish as an important source of food. To stimulate production, scientific research on the habits and propagation of fish is carried on. The breeding of fish and their distribution into lakes and streams is done on a large scale. In all of this work, but particularly in connection with the propagation of fish and the protection of fish against lawlessness, the Bureau cooperates with the various states. The responsibility of the government for work of this kind is obvious, and there can be no doubt as to its being profitable.

## THE BUREAU OF LABOR STATISTICS AND THE WOMEN'S AND CHILDREN'S BUREAUS

The Bureau of Labor Statistics gathers the statistics of wages in the various industries and of the cost of living, and publishes much valuable material of interest to labor and capital. The prosperity and happiness of all the people depend to a considerable extent upon industrial peace and freedom from strikes and disorder. Industrial peace and contentment require justice and fair dealing between employers and employed. In order that both may know what is just and fair, statistical information as to wages and changes in prices and the cost of living is essential. It is probable that the greatest obstacle to a good understanding between employers and employed is lack of information. Suspicion and prejudice often give way to sympathy and understanding when full information, including information about what others are doing, is made available. The good results achieved by generous treatment of labor should be put before all employers, and if the government would spend more on research and education in this important field, might it not save much that is now spent in other directions? And might not the public be saved much both in expense and inconvenience that results from industrial warfare? This subject is of such tremendous and far-reaching importance that one is led to ask whether the government is doing as much as it should in this connection.

The work of the Women's and Children's Bureaus is relatively new, but of great importance. Women are employed in the industries more than ever before, and the high wages and shortage of labor increase the pressure for the work of children. In the interest of the state, apart from considerations of humanity, women and children should be protected in the industries; and the work of these two bureaus is therefore of fundamental importance. It seems likely that it will grow rapidly in magnitude and occupy a larger place in the public's thought.

## EDUCATIONAL WORK

The Bureau of Education collects and disseminates information concerning educational matters. The federal government has never taken a very active part in the educational work of the country. Whereas cities spend an average of $6 per year per capita for education and the states and private agencies about $3 per year per capita, the federal government spends only 6 cents per capita per year, including the sums expended in vocational education and assistance granted to colleges of agriculture and mechanic arts. Common schools and high schools are maintained by towns and municipalities, with some aid from the state. Normal and secondary schools, colleges and universities, are maintained by the states and private agencies. Indeed private schools and privately endowed colleges and universities constitute a very important part of our educational system. The federal government, on the other hand, has no national university, and spends no money in the District of Columbia on higher education, except for Howard University for colored students. For many years the Bureau of Education has been doing a valuable work in keeping a record of the educational work of the country. Its support might well be greatly augmented, its scope broadened and its activities and responsibilities correspondingly increased. We believe thoroughly in this country in popular education. We believe that the welfare of the state demands an intelligent electorate, and that material prosperity goes with education. The war revealed an unsuspected percentage of illiteracy in the men examined for military service. A million men in the draft could not read and write. The federal government might well take greater responsibility in matters of education and cooperate more actively with the states, setting standards for educational work and giving direction and encouragement where they are needed. A department of Education with a cabinet member at the head, has more than once been proposed, and is even now being discussed.

Better facilities for higher education in the District of Columbia would be of great value to thousands of federal employees, as well as to other residents of Washington. The desire of federal employees for educational advancement should be encouraged and the needed facilities supplied, partly for their own sake and partly because they would thereby be enabled to render better service to the government. Washington is the proud capital of the richest nation on earth, and yet there are few cities in America and few capitals anywhere in the world where so little is done for higher education.

Recently, the Federal Board for Vocational Education has been established, and a substantial sum placed at its disposal. The need for vocational training was emphasized by the results of tests made in the army. Of men claiming expert knowledge of the skilled trades, only six in a hundred were found to be really expert. The Board assists the states financially and otherwise in developing and maintaining a system of vocational training. Such work is greatly needed as industry itself fails to supply the training necessary.

For many years the government has been cooperating with the states by paying a certain sum of money each year to one college in each state for the teaching of agriculture and mechanic arts. This was provided for under the Morrill act, and these payments now amount to $2,500,000 per year. In most cases these sums are a very substantial help to the institutions receiving them, and undoubtedly do a very great deal of good in the aggregate.

An English journal, commenting on the increased sums allotted in the English budget for next year to scientific and industrial research, has this to say: "Education and the financing of that education are important subjects. Indeed, we do not hesitate to say that upon the right methods of instruction being followed depends very largely the future prosperity of the nation."

## THE LIBRARY OF CONGRESS AND THE SMITHSONIAN INSTITUTION

The Library of Congress is a great national institution, corresponding to the British Museum and the Bibliothèque Nationale. It is properly grouped with the educational institutions of the government, and it is an institution of which all Americans are proud. It is a great library, housed in a beautiful building, useful to thousands, enjoyed by hundreds of thousands. The country approves a generous policy toward this activity of the government, devoted as it is to art and education.

The Smithsonian Institution and the National Museum are national institutions devoted to science, art and natural history. The Smithsonian Institution has a private endowment, but the greater portion of its funds come from the government. It carries out scientific researches in the physical and natural sciences and has extremely valuable collections in its museums and art galleries. The government has not done as much in promoting art and collecting works of art as have many other governments, and it is to be hoped that much may be done in the future to compensate for past neglect of these matters.

## THE PUBLIC HEALTH SERVICE

The Public Health Service is one of the most important of the agencies doing work of research and education. It maintains supervision over incoming vessels to prevent the introduction of diseases; to prevent the spread of diseases between the states it makes inspections and cooperates with the state departments of health; statistics of diseases are collected and interpreted; and scientific research is carried out to develop methods of preventing the spread of disease.

The Service has recently formulated a comprehensive health program to be carried out on a nation-wide scale by the active cooperation of federal, state and local authorities and voluntary organizations. That these needs are urgent is shown by the fact that more than one third of all men examined under the draft during the war were rejected for physical defects and diseases. The Surgeon General states that in large measure these defects and diseases could have been prevented had proper attention been given to them, especially in childhood. This unsatisfactory condition of the public health shows the need of greater attention on the part of the federal government, and more systematic cooperation between local and national agencies. This systematic cooperation is obtained by the federal aid extension principle, as in the construction of good roads, and agricultural education.

A large amount of most valuable medical, statistical and research work is carried on by the Public Health Service, which has been greatly developed in recent years. The opportunities presented in this work for growth and increased usefulness are almost boundless. In addition to its work in connection with the public health, a large amount of work is done in the care and rehabilitation of sick and wounded soldiers.

The foregoing brief outline of the activities of the various government agencies included in Group VI gives a very incomplete statement of the research and educational work done by the government. It is, however, intended to convey some idea of the wide range and important character of this work, and its great possibilities for development if more adequate provision could be made for its support. A portion of the work of the Bureau of Chemistry, the Bureau of Standards, the Coast and Geodetic Survey and other bureaus of Group IV would have been included in Group III if the work of the bureaus had been split up and the classification had been more detailed and exact. On the other hand, a portion of the work of the Naval Observatory, the Bureau of the Census, and other bureaus in other groups is scientific and educational. It is not possible to make a simple classification that is perfectly exact, but it is believed that the one given is sufficiently exact for the purpose. The Public Works group has value in economic development, but it is not research and educational, and is quite different from most of Group VI. It is now proposed to speak more in detail of one important kind of scientific research, namely, that designed to develop the industries of the country. This work is done primarily in the public interest, although it is generally helpful and beneficial to the individual owners.

(*To be concluded*)